REMARKS

Claims 1, 2, 4, 5, 9-12, 25 and 26 are currently pending in the subject application and are presently under consideration. A current listing of the claims is at pp. 2-6 of the Reply.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1, 2, 4, 5, 9-12, 25 and 26 Under 35 U.S.C. §102(e)

Claims 1, 2, 4, 5, 9-12, 25 and 26 stand rejected under 35 U.S.C. §102(e) as being anticipated by Subramanian *et al.* (US Patent 6,562,248 B1). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Subramanian *et al.* does not anticipate each and every element as set forth in the subject claims.

> A single prior art reference anticipates a patent claim only if it expressly or inherently describes each and every limitation set forth in the patent claim. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the … claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The claimed invention relates to a system that facilitates monitoring, measuring and/or controlling the fabrication of apertures in alternating aperture phase shift masks employed in semiconductor manufacturing. Independent claims 1, 25 and 26 recite similar limitations, namely: *a system that measures an etch of a mask feature, comprising, one or more mask creating components…; a driving component that controls the one or more mask creating components; an emitting component…; and an analysis component that measures one or more feature parameters based on a light reflected and/or refracted from the one or more features via a scatterometry system,* ***the measured feature parameters utilized by the driving component to control the mask creating component during fabrication process to improve the fabrication process of the alternating aperture phase shift mask and during post-fabrication process to improve quality control in the alternating aperture phase shift mask***. Subramanian *et al.* does not expressly or inherently disclose the aforementioned novel aspects of applicants' invention as recited in the subject claims.

Subramanian *et al.* discloses a system for monitoring and controlling aperture etching in a complimentary phase shift mask. The system includes one or more etching components operative to etch portions of a mask; an etching component driving system; a system for directing light onto the apertures; a measuring system for measuring aperture parameters; a scatterometry system for processing the light reflected from the apertures; and a processor for receiving aperture data and mapping the mask into a plurality of grid blocks. (*See* Col. 15, lines 15-40).

Subramanian *et al.* does not disclose the *in-situ* and *ex-situ* monitoring and control of features of an alternating aperture phase shift mask. Applicants' system for measuring, monitoring and/or controlling alternating aperture phase shift mask fabrication can be employed *in-situ* (*e.g.* during fabrication) to control the fabrication of the mask and/or can be employed *ex-situ* (*e.g.* post-fabrication) in processes like quality control. (*See* pg. 12, lines 23-32). Specifically, the system includes using etching components to etch apertures and/or gratings in the mask, determining the acceptability of the apertures and/or gratings etched in the mask and using *in-situ* coordinating control of the etching components to more optimally etch the apertures in the mask and/or *ex-situ* monitoring to determine whether an acceptable mask has been fabricated. (*See* pg. 9, lines 5-11). The system provides an analysis component that measures one or more feature parameters, the measured feature parameters are then utilized by the driving component to control the mask creating component. The mask creating component is then monitored *in-situ* to control fabrication of the alternating aperture phase shift mask and *ex-situ* to improve quality control in the alternating aperture phase shift mask. Thus, the *in-situ* and *ex-situ* monitoring and control of feature parameters is directed to a particular structure, as it is utilized by the driving component to control the mask creating component.

In contrast, the system of Subramanian *et al.* includes a measurement component to measure the shape, depth and/or width of the apertures in the mask, a detection component for detecting the reflected light, and a control system to configure and control operation of the etching system. (*See* col. 7, lines 31-48). Thus, Subramanian *et al.* is silent with regard to a system that measures an etch of a mask feature by…, ***selectively controlling the etching of one or more apertures based on analysis of data collected and employing the analysis of data in-situ to control fabrication of the alternating aperture phase shift mask and ex-situ to improve***

quality control in the alternating aperture phase shift mask. Accordingly, Subramanian *et al.* does not disclose each and every element as set forth in the subject claims.

In view of at least the above, it is readily apparent that Subramanian *et al.* fails to expressly or inherently disclose applicants' claimed invention as recited in independent claims 1, 25 and 26 (and claims 2, 4-5 and 9-12 which respectively depend there from). Accordingly, it is respectfully requested that these claims be deemed allowable.

II. Rejection of Claims 1, 2, 4, 5, 10-12, 25 and 26 Under 35 U.S.C. §102(e)

Claims 1, 2, 4, 5, 10-12, 25 and 26 stand rejected under 35 U.S.C. §102(e) as being anticipated by Jin *et al.* (US Patent Pub. No. 2002/0028392). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Jin *et al.* does not anticipate each and every element as set forth in the subject claims.

As stated *supra*, the claimed invention relates to a system that facilitates monitoring, measuring and/or controlling the fabrication of apertures in alternating aperture phase shift masks employed in semiconductor manufacturing. Independent claims 1, 25 and 26 recite similar limitations, namely: *a system that measures an etch of a mask feature, comprising, one or more mask creating components…; a driving component that controls the one or more mask creating components; an emitting component…; and an analysis component that measures one or more feature parameters based on a light reflected and/or refracted from the one or more features via a scatterometry system,* ***the measured feature parameters utilized by the driving component to control the mask creating component during fabrication process to improve the fabrication process of the alternating aperture phase shift mask and during post-fabrication process to improve quality control in the alternating aperture phase shift mask***. Jin *et al.* does not expressly or inherently disclose the aforementioned novel aspects of applicants' invention as recited in the subject claims.

Jin *et al.* relates to the use of multilayer film stacks and gray scale processing method to fabricate phase-shifting masks (PSMs) utilized in lithography. Desired optical transmission and phase-shifting functions of the mask are achieved by controlling the optical properties and thickness of constituent film layers. By substantially separating the phase shift and attenuation functions between different film layers, the phase shift mask of Jin *et al.* can be tuned for optimal

performance at various wavelengths more precisely than conventional masks employing a single layer to control both attenuation and phase shifting. (*See* pg. 2, paragraph [0025]).

Jin *et al.* does not disclose the *in-situ* and *ex-situ* monitoring and control of features of an alternating aperture phase shift mask. As stated *supra*, applicants' system for measuring, monitoring and/or controlling alternating aperture phase shift mask fabrication can be employed *in-situ* (*e.g.* during fabrication) to control the fabrication of the mask and/or can be employed *ex-situ* (*e.g.* post-fabrication) in processes like quality control. (*See* pg. 12, lines 23-32). Specifically, the system includes using etching components to etch apertures and/or gratings in the mask and using *in-situ* coordinating control of the etching components to more optimally etch the apertures in the mask and/or *ex-situ* monitoring to determine whether an acceptable mask has been fabricated. (*See* pg. 9, lines 5-11). The system provides an analysis component that measures one or more feature parameters, the measured feature parameters are then utilized by the driving component to control the mask creating component. The mask creating component is then monitored *in-situ* to control fabrication of the alternating aperture phase shift mask and *ex-situ* to improve quality control in the alternating aperture phase shift mask. Thus, the *in-situ* and *ex-situ* monitoring and control of feature parameters is directed to a particular structure, as it is utilized by the driving component to control the mask creating component.

In contrast, Jin *et al.* utilizes multilayer structures which provide etch selectivity. The desired optical transmission at a given wavelength is achieved by adjusting optical properties and thickness of an attenuating layer and employing gray-scale electron beam lithography. (*See* pg. 3, paragraph [0051]). In one embodiment, the use of a multilayer mask in connection with lithography, accurately and uniformly defines the attributes of an alternating aperture phase shifting mask without requiring *in-situ* monitoring of etch depth. (*See* pg. 5, paragraph [0077]). Accordingly, Jin *et al.* is silent with regard to a system that measures an etch of a mask feature, comprising, ***...the measured feature parameters utilized by the driving component to control the mask creating component during fabrication process (e.g., in-situ) to improve the fabrication process of the alternating aperture phase shift mask and during post-fabrication process (e.g., ex-situ) to improve quality control in the alternating aperture phase shift mask***.

Furthermore, Jin *et al.* does not disclose a scatterometry system for profiling the feature parameters based on a light reflected and/or refracted from the one or more features. (*See* Office Action dated 1-17-06, pg. 4). Applicants' claimed invention measures one or more feature

parameters based on a light reflected and/or refracted from the one or more features *via* a scatterometry system. The measured feature parameters are then utilized by a driving component to monitor and control a mask creating component. Accordingly, Jin *et al.* is silent with regard to a system that measures an etch of a mask feature, comprising, ***an analysis component that measures one or more feature parameters based on a light reflected and/or refracted from the one or more features via a scatterometry system,***….

In view of at least the above, it is readily apparent that Jin *et al.* fails to expressly or inherently disclose applicants' claimed invention as recited in independent claims 1, 25 and 26 (and claims 2, 4-5 and 10-12 which respectively depend there from). Accordingly, it is respectfully requested that these claims be deemed allowable.

III. Rejection of Claim 9 Under 35 U.S.C. §103(a)

Claim 9 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Jin *et al.* (US Patent Pub. No. 2002/0028392) in view of Niu *et al.* (US Patent Pub. No. 2002/0131055). It is respectfully submitted that this rejection should be withdrawn for the following reasons. Jin *et al.* and Niu *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims. In particular, Niu *et al.* does not make up for the aforementioned deficiencies of Jin *et al.* with respect to independent claim 1 (which claim 9 depends from). Thus, the subject invention as recited in claim 9 is not obvious over the combination of Jin *et al.* and Niu *et al.*

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [AMDP753US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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